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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/808,225

03/23/2004

Robert P. Masleid

TRAN-P249

5029

45590

7590

04/29/2009

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EXAMINER

MAI, ANH D

ART UNIT

PAPER NUMBER

2814

MAIL DATE

DELIVERY MODE

04/29/2009

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/808,225	Applicant(s) MASLEID ET AL.	
	Examiner Anh D. Mai	Art Unit 2814	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 January 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 32-39,41,42,45-65,67-71,73 and 74 is/are pending in the application.
- 4a) Of the above claim(s) 32-38,41,47-62,68 and 74 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 39,42,45,46,63-65,69-71 and 73 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Status of the Claims

1. Amendment filed January 15, 2009 is acknowledged. Claims 39, 45, 46 and 67 have been amended. Claims 43 and 44 have been cancelled. Claims 32-39, 41, 42, 45-65, 67-71, 73 and 74 are pending. Non-elected invention and species, claims 32-38, 41, 47-62, 68 and 74 have been withdrawn.

Action on merits of Claims 39, 42, 45, 46, 63-65, 69-71 and 73 follows.

Specification

2. The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required:

Claim 39 (as well as claim 69) recites: “wherein a **doping concentration of said separation well is greater than said p-type material substantially surrounding said deep n well**”.

The above does not have antecedent basis in the specification.

Claim Objections

3. Claims 45, 46 and 67 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form.

With respect to claim 45, claim 45 recites: the integrated circuit of Claim 39 **further comprising a p well** coupled to said p region.

However, claim 39 has already include that p well, i.e., **separation well** or **p-type material above said deep n-well**. Both of them are p wells, therefore, claim 45 fails to further limit claim 39.

With respect to claim 46, claim 46 recites: the integrated circuit of Claim 45, wherein said p well extends to substantially a same depth as said deep n well.

However, claim 39 already recites: “a separation well **disposed between** said plurality of substructures (deep n well)”.

Since the separation well or “p well” is already between the deep n wells, then, it is already extended at the same depth.

With respect to claim 67, claim 67 recites: the integrated circuit of claim 39, wherein said separation well **increases** coupling between said p-type material beneath said deep n-well and above said n-well.

However, based on the limitations of claim 39, the separation well of claim 67 does not contain anything more than what has been claimed in claim 39: “wherein **a doping concentration of said separation well is greater than said p-type material substantially surrounding said deep n-well**”.

If the doping concentration of the separation well is already greater than the p-type materials above and below it, **then the coupling is already increased**, therefore, claim 67 fails to further limit claim 39.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claims 39, 42-46, 63-65, 69-71 and 73 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

There does not appear to be a written description of the claim limitation “wherein a **doping concentration** of said separation well is **greater than said p-type material substantially surrounding said deep n well**” (claims 39 and 69) and “wherein said separation well **increases** coupling between said p-type material beneath said deep n-well and above said n-well” (claim 67) in the application as filed. (Emphasis added).

With respect to claims 39 and 69, at best, the specification on page 8, first paragraph states: it is appreciated that **separation p well 290 is not required**.

In the argument submitted January 15, 2009, Applicant asserted: the “p” of the term “separation p well 290”, page 8, lines 1-8, describes as moderately doped.

However, page 5, lines 24-25, states: ...well regions of deep n well capacitor 200, **surface p wells** and epitaxial p-material, ... Thus, “surface p well” is moderately doped as well.

Moreover, with respect to the same designation, the specification as well as claim 39, recites: a “deep **n** well”, is this mean deep **n** well is moderately doped?

Since the surface **p** well is described as “**p**”, thus moderately doped. Therefore, the doping concentration of the separation **p** well is the same as the surface **p** well.

Applicant’s argument further confirmed that the amendment in fact is a new matter.

Applicant must cancel the new matter.

With respect to claim 67, claim 67 recites: the integrated circuit of claim 39, wherein said separation well **increases** coupling between said p-type material beneath said deep n-well and above said n-well.

As discussed above, the dopant concentration of the “separation well” is the same, i.e., moderately doped, as the p material above the deep n well.

Therefore, the term “increases coupling” is new matter.

5. Claim 67 is further rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

With respect to claim 67, claim 67 recites: the integrated circuit of claim 39, wherein said separation well **increases** coupling between said p-type material beneath said deep n-well and above said n-well.

As discussed above, the dopant concentration of the “separation well” is the same, i.e., moderately doped, as the p material above the deep n well.

How can the coupling between the p-type materials above and below **increase** when the doping concentration of the separation well **is the same** as the p-type material above?

Since the doping concentration of the **separation well is the same as that of the p-material above it**, then the coupling of the p-type materials is the same whether the separation well is there or not.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 69-71 are rejected under 35 U.S.C. 102(b) as being anticipated by Watanabe et al. (US Patent No. 5,508,549).

With respect to claim 69, As best understood by Examiner, Watanabe teaches an integrated circuit as claimed including:

one or more wells (5) of a first conductivity type;

one or more wells (50) of a second conductivity type;

a first plurality of transistors (61) within the one or more wells (5) of the first conductivity type;

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a second plurality of transistors (62) within the one or more wells (50) of the second conductivity type;

a deep well (2) of a second conductivity type disposed between one or more wells (5) of the first conductivity type and a substrate (1) of first conductivity type, wherein the deep well (2) includes a plurality of substructures having a plurality of gaps wherein the one or more wells (5) of the first conductivity type are coupled to the substrate (1); and

a separation well (40) of the first conductivity type disposed within one or more of the gaps and coupling the one or more wells (5) of the first conductivity type to the substrate (1), wherein the doping concentration of the separation well (40) is greater than the one or more wells (5) of the first conductivity type and the substrate (1). (See Fig. 14).

With respect to claim 70, a principal operating potential (106) of Watanabe is coupled between the deep well (2) and the substrate (1).

With respect to claim 71, deep well (2) of Watanabe is further disposed between the one or more wells (50) of second conductivity type and the substrate (1), and wherein the deep well (2) further includes a plurality of substructures having a second plurality of gaps (40) wherein one or more wells (50) of the second conductivity type are adjacent to the substrate (1).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 39, 42-46, 63-65, 67 and 69-71 are rejected under 35 U.S.C. 103(a) as being unpatentable over Burr (U.S. Patent No. 6,586,817) of record in view of Watanabe '549.

With respect to claim 39, As best understood by Examiner, Burr teaches an integrated circuit substantially as claimed including:

a plurality of transistors (701; 702) having a principal operating voltage (V_{nw});

a deep n well capacitor structure comprising:

a deep n well (770) segmented into a plurality of substructure proximate

each one of the plurality of transistors, wherein n-type material of the

deep n well is coupled to the principal operating voltage (V_{nw});

a p region (706) substantially surrounding the deep n well (770), wherein

p-type material of the p region (760) is coupled to the ground reference (V_{pw}); and

a separation well (790A, B) disposed between the plurality of

substructures (770) and between the p-type material (706) beneath the

deep n-well (770) and above the deep n-well. (See Fig. 7C).

Thus, Burr is shown to teach all the features of the claim with the exception of explicitly disclosing the doping concentration of the separation well (790A,B) being greater than that of the p-type material (706) surrounding the deep n well.

However, Watanabe teaches an integrated circuit including separation well (40) disposed between the plurality of substructures (2) and having a doping concentration greater than that of the p-type material (1, 5) surrounding the deep n well (2). (See Fig. 14).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention was made to form the separation well of Burr having doping concentration greater than the p-type material surrounding the deep n well as taught by Watanabe to provide the conduction path at a lower resistance.

With respect to claim 42, the deep n well (770) of Burr is parasitically coupled to the principal operating voltage (V_{nw}).

With respect to claim 45, as best understood by Examiner, the integrated circuit of Burr further includes a p well (790A) coupled to the p region (706).

With respect to claim 46, the p well (790A) of Burr extends to substantially a same depth as said deep n well (770).

With respect to claim 63, the deep n well capacitor structure of Burr has a surface area selected to provide a specified amount of decoupling capacitance between one or more of the plurality of transistors and the principal operating voltage. (Same structure same function).

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With respect to claim 64, the plurality of gaps (790A, B) between the pluralities of substructures of Burr does not close under bias conditions.

With respect to claim 65, the plurality of substructures (770s) of Burr provides connectivity between the p-type material (706B) beneath the deep n-well (770) and above (706A) the deep n-well.

With respect to claim 67, as best understood by Examiner, and in view of Watanabe, the separation well increases coupling between said p-type material (706B) beneath the deep n-well (770) and above (706A) the deep n-well.

With respect to claim 69, As best understood by Examiner, Burr teaches an integrated circuit substantially as claimed including:

- one or more wells (706A) of a first conductivity type;
- one or more wells (711) of a second conductivity type;
- a first plurality of transistors (701) within the one or more wells (706A) of the first conductivity type;
- a second plurality of transistors (702) within the one or more wells (711) of the second conductivity type;
- a deep well (770) of a second conductivity type disposed between one or more wells (706A) of the first conductivity type and a substrate (706B) of first conductivity type, wherein the deep well (770) includes a plurality of substructures (770s) having a plurality of gaps (790A,B) wherein the one or more wells (706A) of the first conductivity type are coupled to the substrate (706B); and

a separation well (790A, B) of the first conductivity type disposed within one or more of the gaps and coupling the one or more wells (706A) of the first conductivity type to the substrate (706B). (See Fig. 7C).

Thus, Burr is shown to teach all the features of the claim with the exception of explicitly disclosing the doping concentration of the separation well (790A,B) being greater than that of the one or more wells of the first conductivity type and the substrate.

However, Watanabe teaches an integrated circuit including separation well (40) disposed within one or more of the gaps and coupling the one or more wells (5) of the first conductivity type to the substrate, wherein the doping concentration of the separation well (40) is greater than the one or more wells (5) of the first conductivity type and the substrate (1). (See Fig. 14).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention was made to form the separation well of Burr having doping concentration greater than the one or more wells of the first conductivity type and the substrate as taught by Watanabe to provide the conduction path at a lower resistance.

With respect to claim 70, a principal operating potential (V_{nw}) of Burr is coupled between the deep well (770) and the substrate (706B).

With respect to claim 71, deep well (770) of Burr is further disposed between the one or more wells of second conductivity type (711) and the substrate (706B), and wherein the deep well (770) further includes a plurality of substructures (perforated 770)

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having a second plurality of gaps (790A,B) wherein one or more wells (711) of the second conductivity type (N) are adjacent to the substrate (706B).

8. Claim 73 is rejected under 35 U.S.C. 103(a) as being unpatentable over Burr '817 and Watanabe '549 as applied to claim 69 above, and further in view of Williams et al. (US Patent No. 6,900,091) of record.

Burr and Watanabe are shown to teach all the features of the claim with the exception of explicitly further comprises additional wells of first and second conductivity type and a second deep well of second conductivity type such that the additional wells of the first conductivity type are isolated from the substrate by the second deep well.

However, Williams teaches an integrated circuit aside from deep well (152b) of a second conductivity type having plurality gaps, also includes:

- one or more additional wells (154b) of first conductivity type;
- one or more additional wells (153a) of second conductivity type; and
- a second deep well (152a) of second conductivity type disposed between
 - one or more additional wells (154b; 153a) of first and second
 - conductivity type and the substrate (151), wherein the one or more
 - additional wells (154b) of first conductivity type are isolated from the
 - substrate (151) by the second deep well (152a). (See Fig. 7A).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention was made to form the integrated circuit of Burr, in view of Watanabe, to further include the isolated well of the first conductivity type as taught by Williams so

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that the devices operating at different voltages can be integrated into a same substrate without interfering with the functionality of other device, hence integrated circuit.

9. Claim 73 is rejected under 35 U.S.C. 103(a) as being unpatentable over Watanabe '549 as applied to claim 69 above, and further in view of Williams '091.

Watanabe is shown to teach all the features of the claim with the exception of explicitly further comprises additional wells of first and second conductivity type and a second deep well of second conductivity type such that the additional wells of the first conductivity type are isolated from the substrate by the second deep well.

However, Williams teaches an integrated circuit aside from deep well (152b) of a second conductivity type having plurality gaps, also includes:

- one or more additional wells (154b) of first conductivity type;
- one or more additional wells (153a) of second conductivity type; and
- a second deep well (152a) of second conductivity type disposed between one or more additional wells (154b; 153a) of first and second conductivity type and the substrate (151), wherein the one or more additional wells (154b) of first conductivity type are isolated from the substrate (151) by the second deep well (152a). (See Fig. 7A).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention was made to form the integrated circuit of Watanabe to further include the isolated well of the first conductivity type as taught by Williams so that the devices operating at different voltages can be integrated into a same substrate without interfering with the functionality of other device, hence integrated circuit.

Response to Arguments

10. Applicant's arguments filed January 15, 2009 have been fully considered but they are not persuasive.

Rejection Under 35 U.S.C. 102:

With respect to claim 69, Applicant argues:

In particular, Figure 14 shows that the P⁺ buried region 40, alleged to be a separation well, are disposed entirely between the one or more P wells regions 5, alleged to be one or more wells, and the P substrate 1. Furthermore, Figure 14 shows that the N⁺ buried regions 2, alleged to be a deep well, are not disposed between the one or more P wells regions 5 and the P substrate 1, as interpreted by one of ordinary skill in the art. Instead, the N⁺ buried regions 2 are disposed entirely between the one or more N well regions 50 and the substrate 1.

However, insofar as the claimed limitation is concerned, the integrated circuit of Watanabe as shown in Fig. 14, teaches the separation well (40) of the first conductivity type (P) disposed within one or more of the gaps (spaces between the deep well (2) of a second conductivity type (N)). Furthermore, the deep well (2) of a second conductivity type (N) clearly disposed between one or more wells (5) of first conductivity type (P) and a substrate (1) of first conductivity type (P).

Claim 69 is anticipated by Watanabe, the rejection of claim 69 and the dependent claims are therefore, maintained.

Rejection Under 35 U.S.C. 103:

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With respect to claim 39, Applicant argues that: Burr clearly discloses that the gaps (709, 790A, 709B) in the deep n-well 770 do not include separation wells.

However, the gaps 709, 709A,B, are p type material and situated between the deep n well segments, thus these gaps constitute “separation well” as claimed, since they separate the segments of deep n well.

Applicant further adds: furthermore, Burr clearly discloses that the gaps (709, 709A, 709B) in the deep n-well 770 do not have “a doping concentration ... [that] is greater than said p-type material substantially surrounding said deep n well”.

As discussed above, the specification fails to support the separation well has a doping concentration greater than the p-type material substantially surrounding said deep n well.

Secondly, in view of Watanabe, the separation (40) clearly has a doping concentration greater than the p-type material substantially surrounding said deep n well.

Further note that, the p-type material (5) above the deep n well are only being interrupted by n-type material (50) between them, thus the p-type material (5) still constitutes above deep n well.

With respect to claim 69, similarly, Applicant also argues about the doping concentration of the separation well being higher than p-type material surrounding it.

However, as discussed above, in view of Watanabe, the separation well can be doped at higher concentration than the p material above and below it.

Claims 39 and 69 are obvious over the teaching of Burr and Watanabe, the rejection of claims 39 and 69 and the dependent claims are therefore, maintained.

Conclusion

11. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anh D. Mai whose telephone number is (571) 272-1710. The examiner can normally be reached on 8:00AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (571) 272-1705. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Anh D. Mai/
Primary Examiner, Art Unit 2814